Learning Outcomes

At the completion of this module, you will be able to:

- Explore elements of a Problem Statement
- Explore elements of a Research Question
- Explore elements of a Hypothesis Statement
- Formulate problem statements/research questions/hypotheses for proposed research project
- Explore elements of Purpose/Objective Statements
- Formulate Purpose/Objective Statement for proposed research project
- Examine principles of Scope for a research project
- Understand the difference between Dependent and Independent Variables
- Examine elements of NOI/LOI/EOI
- Outline an NOI/LOI/EOI for proposed research project
A Research Problem Statement is a clear outline of a circumstance or condition that the researcher wants to investigate or “solve”. Problem Statements lead to Research Questions or Research Hypotheses.

Examples include:

- Plant disease transfer during normal cutting and trimming processes is a serious problem for greenhouse growers.
- Some turtle species are becoming endangered. One possible solution is to maximize the number of eggs that are laid and that hatch.
- Photonic technologies have many uses. One might be to identify disease on a plant before it becomes visible to the human eye.
A Research Question is a statement of the specific query the researcher wants in order to address a research problem.

Examples include:

- Will a laser beam cut a plant; and will that plant survive?
- Will the turtle population in the lagoon lay eggs in our proposed new medium?
- Can we identify disease on a plant before it becomes visible to the human eye using LED technologies?
A Research Hypothesis is a statement of relationship between elements being investigated. The purpose of the research becomes proving/supporting or disproving/rejecting the hypothesis.

Examples include:

- Lasers can be used to cut a plant; the plant will survive and grow.
- The turtle population in the lagoon will reject the proposed new medium and prefer to lay eggs in traditional media.
- LED technologies can identify disease on a plant before it becomes visible to the human eye.
An area of concern and analysis in determining the best support methods to ensure college student success is that of the potential impact of outside work on college student course grades.

- Write a problem statement.
- Write at least two research questions following from the problem statement.
- Write a research hypothesis statement following from the problem statement.
An area of interest to a winemaker is customer reaction to two new wines and whether the consumer prefers one new wine over another.

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- Write at least two research questions following from the problem statement.
- Write a research hypothesis statement following from the problem statement.
A Research Purpose or Goal Statement is a clear statement of the overall goal of the proposed research project. It describes the relationship between the problem statement and the research questions or hypotheses. It often includes:

- Opening statement, “The purpose of this research is to…”
- Clear final objective, “…determine whether working while attending college has an impact on the grades received by college students”
- Reason for the research, “…in order to assist colleges in designing student success supports and strategies”

Write a Research Purpose or Goal Statement about whether the wine consumer prefers one new wine over another.
Variables

A Variable is an element related to the research question or hypothesis.

Two kinds of Variables exist:

- **Dependent Variable**: deals directly with the concept being investigated. It has a minimum of two points of measurement.

- **Independent Variable**: deals indirectly with the concept being investigated. The variable may have an impact on the dependent variable or the research question. The greater the control over the independent variable, the more reliable the results.
Practise Assigning Variables

Assign Dependent Variables for:

- The potential impact of outside work on college student course grades
- The consumer preference for one wine over another

Assign Independent Variables for:

- The potential impact of outside work on college student course grades
- The consumer preference for one wine over another
Quantitative or Qualitative Research Designs? Both?

**Quantitative** design will define and control the research process to ensure consistency and objectivity.
- It will use Instruments that specify and objectify the collection process: questionnaires, surveys, data collection and analysis tools
- It will use a Scale that is consistent (e.g. numerical; descriptive such as “always, sometimes, occasionally, never”)

**Qualitative** design will not aim to measure in specific or concrete ways. It will aim to expand understanding through participants’ sharing of their experiences.
- It will use unstructured interviews and open ended surveys
- It will use group interviews
- It will use participant observation
Determine the Appropriate Research Designs

Determine the most appropriate research design for:

- The potential impact of outside work on college student course grades
- The consumer preference for one wine over another
Research Scope answers the overall questions:

**How much?** How broad should the research study or experiment be to answer the questions or hypotheses?

**How little?** How narrow should the research study or experiment be to answer the questions or hypotheses?
Practise Determining Scope

Determine how much should be included to answer a research question or hypothesis for:

- The potential impact of outside work on college student course grades
- The consumer preference for one wine over another

Determine how little can be studied to answer a research question or hypothesis for:

- The potential impact of outside work on college student course grades
- The consumer preference for one wine over another
NOI/LOI/EOI

Notice of Intent/Letter of Intent/Expression of Interest are documents that outline the proposed research project. They include:

- Proposed project title
- Purpose statement
- Research team
- Dates and location of research
- Proposed budget
- Background/rationale/reason for research
- Basic workplan, timelines and outputs
- Main deliverables of the project
Various funders or industry partners use different formats and varying levels of required detail. Practice with various examples from colleges and funding agencies.
Proposed Research Project

- Determine/select team research project
- Determine roles of research team
- Develop research problem statement
- Develop research question(s) or hypothesis
- Develop purpose/goal statement
- Determine scope of project
- Write an Expression of Interest for the research project